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ABSTRACT:

CHG DATE=19990617 STATUS=O> A partition wall comprises two gypsum internal partition boards 4 disposed with a certain interval provided therebetween and two gypsum external partition boards 9 with a certain interval provided from the internal partition boards 4 so as to form three closed spaces 5, 11, 11. The position of an internal partition boards-connected portion 6 disposed on one side does not coincide with the position of an internal partition boards-connected portion 6 disposed on the other side. A gypsum reinforcing board 7 is adhered by an adhesive 8 to the external face of the

internal

partition boards-connected portion 6. The external partition boards are adhered by the adhesive 8 to the reinforcing board 7 in such a manner that an external partition boards-connected portion is disposed between both ends of the reinforcing board 7.

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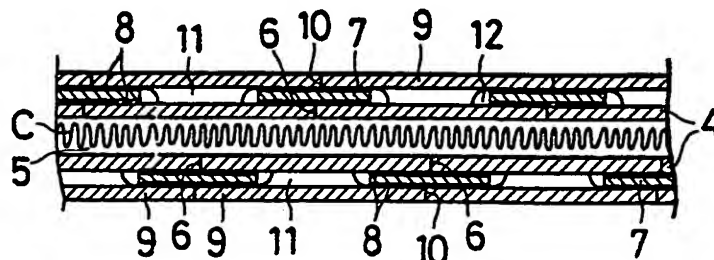
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94 Fire-Resistant partition wall of building.

27 A partition wall comprises two gypsum internal partition boards 4 disposed with a certain interval provided therebetween and two gypsum external partition boards 9 with a certain interval provided from the internal partition boards 4 so as to form three closed spaces 5, 11, 11. The position of an internal partition boards-connected portion 6 disposed on one side does not coincide with the position of an internal partition boards-connected portion 6 disposed on the other side. A gypsum reinforcing board 7 is adhered by an adhesive 8 to the external face of the internal partition boards-connected portion 6. The external partition boards are adhered by the adhesive 8 to the reinforcing board 7 in such a manner that an external partition boards-connected portion is disposed between both ends of the reinforcing board

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FIG 2



## FIRE-RESISTANT PARTITION WALL OF BUILDING

### Field of the Invention

The present invention relates to a partition wall which forms the boundary between rooms in concrete buildings such as multistoried buildings, buildings, schools, hotels, hospitals, and the like and more particularly, to a partition wall which is easily installed on rooms in concrete buildings and superior in sound insulation and fire resistance.

### Prior Art

It is desired that a partition wall which forms the boundary between rooms in concrete buildings such as multistoried buildings, buildings, schools, hotels, hospitals, and the like are superior in sound insulation and fire resistance.

The present applicant filed a utility model application laid open to public inspection under Japanese Utility Model Publication No. 35690/1984. As shown in Fig. 7, the partition wall according to the disclosure comprises two internal partition boards 51, 51; external partition boards 52, 52 and gypsum bond 55. In detail, the internal partition boards 51, 51 are formed by connecting the end faces of a plurality of gypsum boards disposed in contact with and along steel runners fixed to ceiling and floor walls. A certain interval is provided between the two internal partition boards 51, 51. Gypsum external partition boards 52, 52 are installed in the exteriors of the internal partition boards 51, 51 with a certain interval provided from the internal partition boards 51, 51. Thus, an internal closed space 53 is formed between the internal partition boards 51, 51. The external and internal partition boards 51, 2 are connected by the gypsum bond 55. Thus, external closed spaces 54, 54 are formed between the respective internal partition boards 51 and external partition boards 52, i.e., three closed spaces 53, 54, 54 are formed inside the fire-resistant partition wall.

Since the above-described fire-resistant partition wall comprises the internal and external partition boards connected to each other by the gypsum bond 55, the internal and external partition boards 51, 52 must be thick so that the partition wall may be rigid. Accordingly, such a partition wall is heavy and the spaces of rooms where the partition wall is installed are reduced by thickness of the partition wall. Further, since the internal partition board is connected to the external partition board by gypsum bond, heat is transferred from the external partition board to the internal partition

board to a small extent. As such, when a fire breaks out, the external partition wall disposed nearer to the fire than the internal partition board is overheated in a short period of time and consequently, burnt down. When the external partition board is burnt down, the internal board adjacent to the external partition board which has burnt down is subjected to the fire, with the result that the internal partition board is burnt down and the external partition board, disposed on the side opposite to the external partition board which has burnt down, is overheated in a short period of time.

### Summary of the Invention

It is an object of the present invention to provide a partition wall superior in fire resistance and sound insulation.

It is another object of the present invention to provide a partition wall which is thin and yet rigid.

It is further object of the present invention to provide a partition wall which is easily installed on a room of a building and as such, inexpensive.

A partition wall according to the present invention comprises gypsum internal partition boards with a certain interval provided therebetween; gypsum external partition boards with a certain interval provided from the respective internal partition boards; and three closed spaces provided inside the partition wall; the partition wall being characterized in that an internal partition boards-connected portion disposed on one side of the partition wall does not coincide with an external partition boards-connected portion disposed on the side opposite to the above-described portion; and a gypsum reinforcing board is adhered to the external face of the internal partition boards-connected portion by an adhesive, and the external partition boards are adhered to the external face of the reinforcing board by an adhesive in such a manner that an external partition boards-connected portion is disposed between both ends of the reinforcing board.

The partition wall having the above-described construction is very rigid although it is composed of thin gypsum boards. Further, the partition wall is superior in fire resistance and sound insulation. Furthermore, since the respective partition boards are composed by only adhering gypsum boards by an adhesive, it is manufactured easily and no skilled workmanship is necessary in installing it on a room and it is installed with efficiency.

### Brief Description of the Drawings

Fig. 1 is a partially cutaway perspective view of a partition wall according to the present invention.

Fig. 2 is a plan view in a cross section of principal portions of the partition wall.

Fig. 3 is a graph showing sound insulation characteristic of the partition wall.

Figs. 4 through 6 are views showing other embodiments according to the present invention.

### Description of the Preferred Embodiments

In the drawings, numeral 1 denotes a ceiling wall of a building; 2, floor wall of the building; 3, channel-shaped runners fixed to walls, namely, the ceiling wall 1 and floor wall 2. Blades of the upper runner 3 confront the blades of the lower runner 3.

Fixed to the blades of the upper and lower runners 3, 3 are internal partition boards 4, 4 formed by connecting a plurality of gypsum boards as shown in Fig. 2. The thickness of an internal closed space 5 formed between the internal partition boards 4, 4 equals to the width of the runner 3. A sound insulation material (C) such as glass wool is filled in the internal closed space 5. The position of an internal partition boards-connected portion 6 coincides substantially with the middle of the internal partition board 4 which confronts the portion 6.

A gypsum reinforcing board 7 which serves as a spacer and is half the length of the internal partition board 4 is adhered to the internal partition boards-connected portion 6 by an adhesive 8 consisting of vinyl acetate. Accordingly, as shown in Fig. 2, the reinforcing boards are staggered in a plan view.

External partition boards 9 whose lengths are same as that of the internal partition board 4 is adhered to the external face of the reinforcing board 7 by the adhesive 8 consisting of vinyl acetate in such a manner that an external partition boards-connected portion 10 is disposed at substantially the middle of the reinforcing board 7. The position of the internal partition boards-connected portion 6 does not coincide with the position of the external partition boards-connected portion 10 as shown for example in Fig. 2. In this manner, an external closed space 11 whose length is same as that of the reinforcing board 7 is formed between the internal partition board 4 and the external partition board 9, thus the external closed space 11 being staggered in a plane view as shown for example in Fig. 2.

As such, a space where the reinforcing board 7 is provided between the internal and external partition boards 4, 9, namely, a space which confronts a space where the external closed space is provided between the internal and external partition boards 4, 9 consists of three gypsum boards adhered to each other. Accordingly, the partition wall is rigid and further, sound does not leak therefrom when the partition wall is vibrated. Furthermore, since the internal partition board 4 is connected to the external partition board 9 by the reinforcing board 7 which is half the length of the internal and external partition boards 4, 9, heat is favorably transferred from the external board 9 to the internal partition board 4, so that the partition wall is not locally overheated, that is, the partition wall is not burnt down in a short period of time.

In this embodiment, a gypsum bond is at a certain interval provided between the end face of the reinforcing board 7 and the external face of the internal partition board 4 so as to reliably adhere the reinforcing board 7 to the internal partition board 4 and increase the heat insulation performance of the partition wall. In this case, as shown in Fig. 2, the cross-linking of sound can be effectively prevented by providing the gypsum bond in such a manner that the gypsum bond 12 does not contact or contacts with the external partition board 9 to a slight extent.

Fire resistance tests and sound transmission loss tests were conducted on a partition wall comprising gypsum internal and external partition boards whose thicknesses were 12 mm and whose surface density was 8.4 kg/m<sup>2</sup>, runners whose lengths between blades was 45 mm, gypsum reinforcing boards whose thickness was 15 mm and whose surface density was 11.4 kg/m<sup>2</sup>. Glass wool was filled in the internal closed space. The thickness of the glass wool used was 25 mm. The density of the glass wool was 24.0 kg/m<sup>3</sup>. In the fire resistance test, a partition wall heated for two hours (the highest temperature the partition wall was subjected to was 1,010°C). As a result, the partition wall underwent neither deformation nor destruction. The temperature of the interior of the partition wall was not over 70°C. As shown in Fig. 3, three standard curves were set as follows: When center frequency was over 2,000 Hz, sound pressure was set to be constant. A line was drawn from the point obtained when center frequency was 500 Hz to the point obtained when center frequency was 2,000 Hz, in which case, the difference between the two points was 10 dB. Likewise, a line was drawn from the point obtained when center frequency was 125 Hz to the point obtained when center frequency was 500 Hz, in which case, the difference between the two points was 15 dB. The sound insulation

performance obtained was over the standard curve (this is specified as D-45) which passes through the point 4a5 dB when center frequency was 500 Hz.

In a partition wall as shown in Fig. 4, the sound insulation material (C) was not filled in the internal closed space 5. The partition wall was heated for two hours, however, it was not damaged and sound insulation performance value was over D-35 (standard curve shown by a broken line in Fig. 3.)

A partition wall as shown in Fig. 5 can be used at a place where only sound insulation performance is considered. Unlike the first embodiment according to the present invention, no gypsum bond is provided between the external face of the internal partition board 4 and the end faces of the reinforcing board 7. The sound insulation value obtained by the partition wall having this construction was over D-45.,

In a partition wall as shown in Fig. 6, an angle was used as a steel runner and a spacer composed of gypsum board is disposed at the upper and lower ends between the internal partition boards 4, 4 so as to form an internal closed space therebetween. According to this construction, the length of the reinforcing board 7 is 1/4 of the gypsum board which composes internal and external partition boards. The partition wall was subjected to heating for an hour (highest temperature the partition wall was subjected to was 935°C). The sound insulation value obtained was over D-35.

#### Claims

1. A partition wall comprising gypsum internal partition boards 4 disposed with a certain interval provided therebetween, gypsum external partition boards 9 disposed with a certain interval provided from said internal partition boards 4 so as to provide three closed spaces in said partition wall; said partition wall being characterized in that the position of an internal partition boards-connected portion 6 disposed on one side does not coincide with the position of an internal partition boards-connected portion 6 disposed on the other side, and a gypsum reinforcing board 7 is adhered to the external face of said internal partition boards-connected portion by an adhesive 8, and said external partition boards 9 is adhered to the external face of said reinforcing board 7 in such a manner that an external partition boards-connected portion 10 is disposed between both ends of said reinforcing board 7.

2. The partition wall, according to Claim 1, characterized in that the width of said reinforcing board 7 is half the length of the gypsum board which composes said internal partition board 4 and external partition board 9.

3. The partition wall, according to Claim 1, characterized in that the width of said reinforcing board 7 is 1/4 of the gypsum board which composes said internal partition board 4 and external partition board 9.

4. The partition wall, according to Claim 1, characterized in that a sound insulation material (C) is filled in the internal closed space 5.

5. The partition wall, according to Claim 1, characterized in that the adhesive 8 which adheres said reinforcing board 7 to said internal partition board 4 and said external partition board 9 to said reinforcing board 7 consists of vinyl acetate.

6. The partition wall, according to Claim 1, characterized in that the gypsum bond 12 is provided between the end faces of said reinforcing board 7 and the external face of said internal partition board 4.

FIG 1

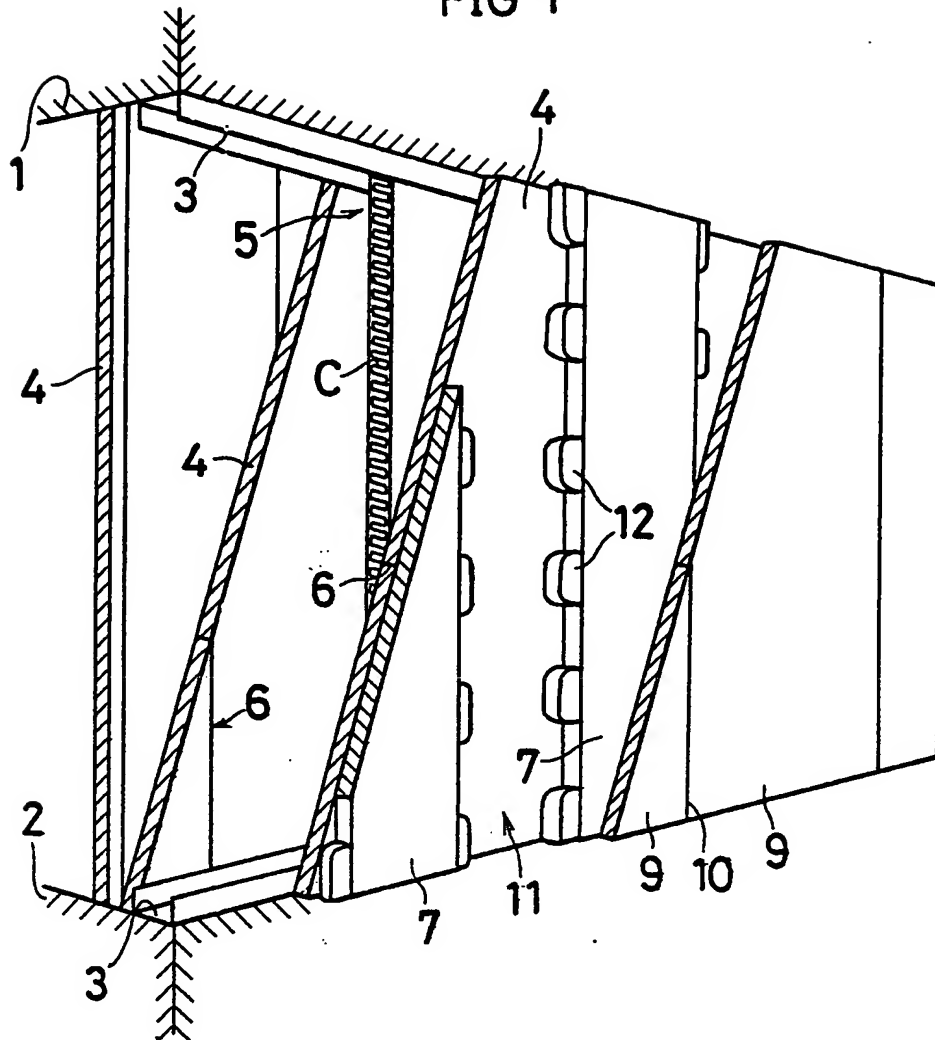


FIG 2

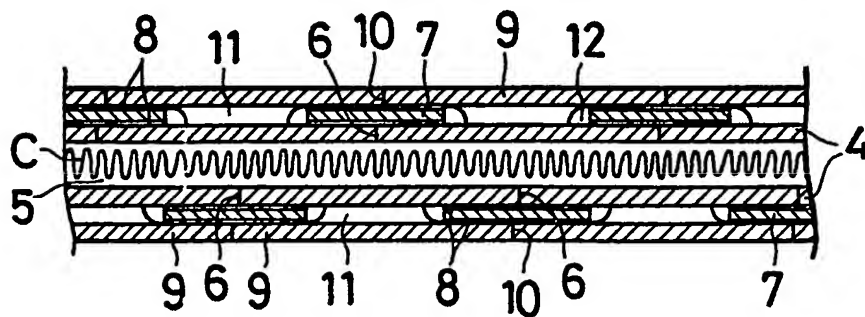


FIG 3

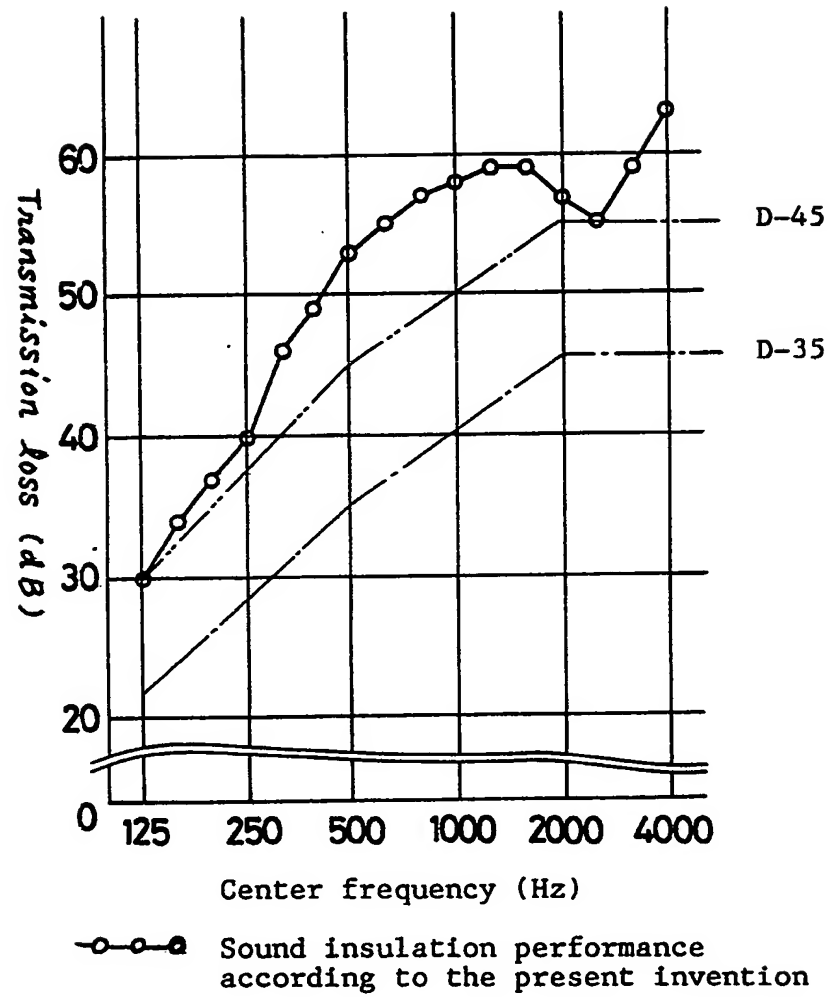




FIG 4

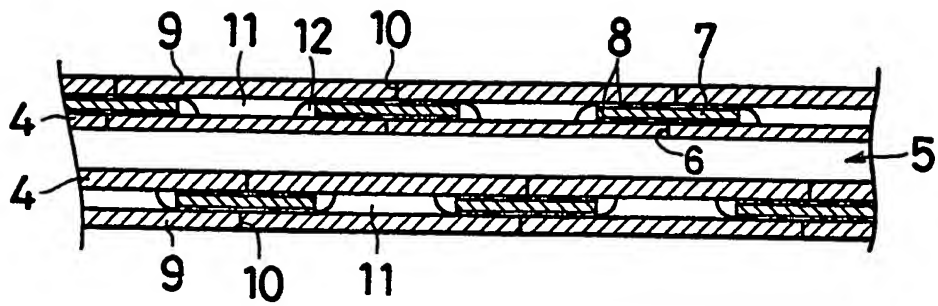


FIG 5

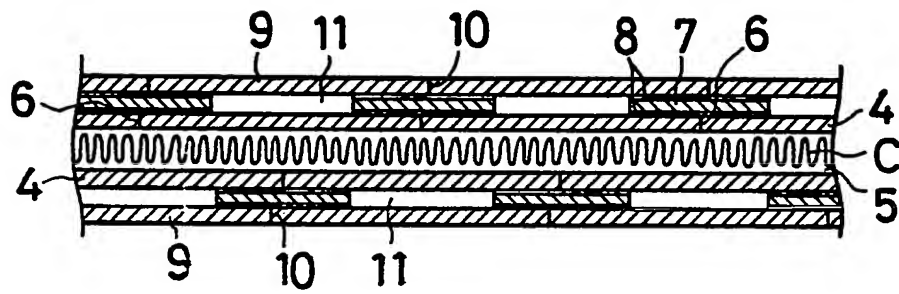


FIG 6

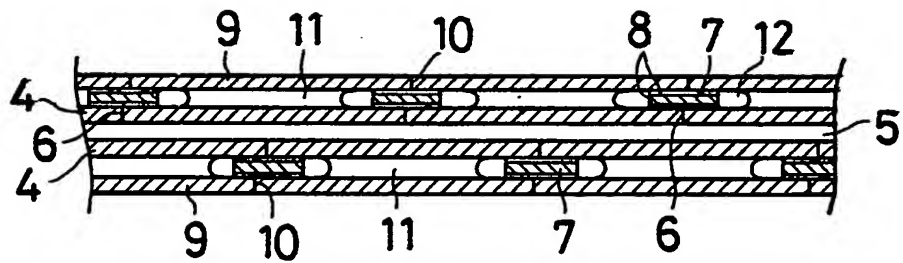
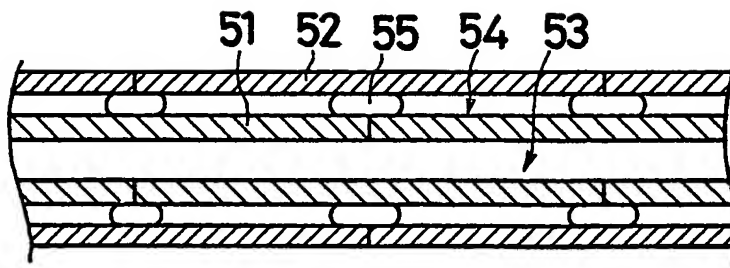


FIG 7





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 87 30 7574

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	DE-A-3 033 451 (DEUTSCHE METALLTÜREN-WERKE) * Page 7, lines 1-5; page 7, line 28 - page 8, line 10; page 8, lines 12-22; figures *	1	E 04 B 2/74 E 04 B 1/94
Y	DE-A-2 611 033 (ARMSTRONG CORK CO.) * Page 8, line 12 - page 9, line 6; figure 5 *	1	
A		4	
A	FR-A-1 576 287 (BPB INDUSTRIES LTD) * Page 6, lines 3-16 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			E 04 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-12-1987	Examiner LAUE F.M.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			